



## **JS-BOX**

### **JS-BOX-DEMO**

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## **VISUAL INDOOR POSITIONING SYSTEM (VPS)**

***JS-BOX localizes in real-time any mobile systeme precisely in an indoor environment.***

***JS-BOX integrates the JACK-SLAM© software, a VSLAM (Visual Simultaneous Localization And Mapping) developed by ip sum tek, the latest state-of-the-art technology to locate any mobile system indoor based on camera vision.***

***JS-BOX-DEMO is the same product but it integrates a battery and have a 1-year license.***

### **Brochure**

Version : 1.0

Public usage

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## Presentation

JS-BOX enables precise tracking of moving vehicles indoors. It can deliver an accuracy of up to some centimeters, and does not require UWB antennas or anchors, BLE or Wi-Fi receivers, RFID tags, etc. in your venue.

Therefore, it is easy to roll out inside any type of environment and it is considered the most flexible indoor tracking technology available on the market today.

The users typically leverage the indoor localization for any mobile device (forklift, robotics cleaning machine, AGV and AMR robots, drones, ...).

The JS-BOX is dedicated for an indoor usage, but it can be used also outdoor where a better accuracy than GPS is required. It works in urban and peri-urban environment

The JS-BOX uses the JACK-SLAM© software developed by ip sum tek company. See the JACK-SLAM© documentation for detailed operation of this software.

## Highlights

**The JS-BOX is a cost-effective system to localize any vehicle in an indoor environment.**

### **A really cost-effective alternative to LIDAR and UWB**

This is a visual positioning system using only a classic camera to provide an accurate location to all types of robots: AGV, forklifts, drones, service robots, and all automated vehicles (AGV).

### **On board processing – no internet connection required**

JS-BOX can run completely offline without loss of accuracy and speed.

### **Robust localization**

Unlike a LIDAR solution which locates with its horizontal stream at 40cm above the ground, the JS-BOX can have its camera turned toward the ceiling to locates based on immutable points (lights, ceiling structure, top of windows and doors, ...).

JS-BOX is insensitive to moving objects.

### **No hardware in your venue**

No receivers, no tags, no antennas, no nodes, magnetic stripes, QR codes.

Nothing has to be deployed through the venue.

The JS-BOX localizes using only on the existing features of its environment.

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### **Real-time**

The JS-BOX updates the position of the devices at the same rate of its camera: Generally, 20 to 25 positions/s.

### **6DOF**

The JS-BOX calculates the position in 6DOF: X, Y, Z locations and Rx, Ry, Rz rotations. It also provides WGS-84 coordinates of the position

### **Durability**

LIDARs are quite fragile and sensitive. JS-BOX works using its on-board camera, and as long as the camera works, the system works.

### **Accurate localization**

JS-BOX localizes with a centimeter accuracy.

### **Shared maps among the fleet**

JS-BOX is perfect for a use within a robot or forklift fleet as the generated map is shared by all elements of the fleet.

The initial map is built by only one box and then send to all other JS-BOXes of the fleet.

### **Easy to use**

No difficult instructions. JS-BOX can be installed and configured quickly.

Just have to screw it on a mobile device and begin to map a venue.

## **Differences between JS-BOX and JS-BOX-DEMO**

These are the same products with exactly the same capabilities but JS-BOX-DEMO permits to test the system.

JS-BOX-DEMO integrates:

- A rechargeable battery (avoiding to connect the box to an external power supply).
- A 1-year license usage (enough to test the system).



The JS-BOX-DEMO permits to test quickly the system in-situ.

## JS-BOX specifications

<b>Technology</b>	Visual SLAM
<b>Dimensions</b>	96 x 96 x 54 mm
<b>Power input</b>	10 to 32VDC
<b>Sensor</b>	High dynamic RGB camera
<b>Noise</b>	Totally fanless. Silent operation
<b>Temperature Range</b>	0°C to +50°C
<b>Interface</b>	Wi-Fi or Ethernet
<b>Localization accuracy after LC</b>	< 10 cm (when loop closure is performed)
<b>Drift in open loop</b>	< 3% of the of the route without loop closure
<b>Output results</b>	Metric coordinates 6DOF or WGS-84 coordinates
<b>Options</b>	RS-232 or CAN-BUS to issue the results
<b>External camera</b>	Usage of on-board camera or an external camera (maxi 3m)
<b>Indicator</b>	RGB led to specify the system state

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## Features and functions

**YGGY robots are totally autonomous. They integrate many functions:**

- *Real time: Localize any robot/vehicle with the natural visual features of the venue*
- *Localization with centimeters accuracy*
- *Low cost: Nothing to install in the environment.*
- *Reliable: Cope with difficult cases such as light changes, lack of illumination, dynamic objects, texture-less scenes.*
- *Insensitive to moving objects: humans, animals, other robots, etc.*
- *Insensitive to modification of the venue if camera is turned toward the ceiling.*
- *Efficient: Loop closures mechanism generating accurate maps.*
- *Map update: Automatic each time the device returns to an area already visited.*
- *Map sharing: With all other robots of the fleet*
- *Virtual markers: To scale the map on a real environment*
- *Fast relocalization when the device is suddenly placed anywhere in its map.*
- *3 modes to use it: mapping, locOnly or Idle*

## Application sectors

**It can be used everywhere, on any mobile device (AGV, AMR, any vehicle, ...)**

- *General industry.*
- *Logistics and assembly plants.*
- *Fleets (forklifts, AMRs, cleaning machines, ...)*
- *Industrial floor cleaning machines*
- *Drones*
- *Public places (hospitals, museums, airports, ...).*
- *Supermarkets and Retail stores.*
- *Offices.*
- *Security.*
- *Research Labs.*
- *Hotels and Restaurants.*
- *Farms and greenhouses*
- *Medical*

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## How it works

JS-BOX uses the natural landmarks of the places in which it evolves: light fixtures, corners of doors or windows, ...It tracks these landmarks from image to image and locates itself in real time by performing a triangulation.

Depending on the environment, it uses 30 to 300 landmarks in an image to locate.



<https://www.youtube.com/watch?v=1bLA8zCNh7U&t=1s>

In this video we see what the JS-BOX is seeing and the green points are the features it takes to perform the localization.

Camera is turned at 70° towards the ceiling and 20° forward:

This is an ideal inclination for a localization performed with landmarks on the ceiling and the tops of the walls.

In this video, we also see that direct lights do not affect the localization.

## Demonstration video on a real case

Here is a video demonstrating the JS-BOX localization:

In this video, the JS-BOX is mounted on an industrial cleaning machine.

It evolves in a 20,000m<sup>2</sup> supermarket with its camera fully turned towards the ceiling.

Video is accelerated for convenience.

After having done 400m, the machine comes back to a zone already mapped:

We can notice at this moment that the precision before this loop closure is excellent (about 10m difference) and that the map becomes consistent once the loop is closed.

<https://www.youtube.com/watch?v=RRRC1FG9ITA>